OPERATING AND MAINTENANCE MANUAL FOR ELECTRIC BOOSTER HEATER

Hubbell™

ELECTRIC HEATER COMPANY

BASE MODEL " A "

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-- IMPORTANT --

Always reference the full model number and serial number when calling the factory.

WARNING / CAUTION

1. Tank is to be completely filled with water and all air is to be vented before energizing.

2. Due to the rigors of transportation, all connections should be checked for tightness before heater is placed in operation.

3. Safety relief valve must be installed in tapping provided.

4. The refractory material used in heating elements may absorb some moisture during transit, periods of storage, or when subjected to a humid environment. This moisture absorption results in a cold insulation resistance of less than twenty (20) megohms. If this heater has been subjected to the above condition, each heating element must be checked for insulation resistance before energizing. A low megohm condition can be corrected by removing the terminal hardware and baking the element in an oven at 350°F -700°F for several hours or until the proper megohm reading is obtained.

5. KEEP AWAY FROM LIVE ELECTRICAL CIRCUITS.
   Do not perform any maintenance, make any adjustments, or replace any components inside the control panel with the high voltage power supply turned on. Under certain circumstances, dangerous potentials may exist even when the power supply is off. To avoid casualties, always turn the power supply safety switch to off, turn the charge or ground the circuit before performing any maintenance or adjustment procedure.

6. The unit is designed to operate at pressure not more than 150 psi.

7. Generalized instructions and procedures cannot anticipate all situations. For this reason, only qualified installers should perform the installations. A qualified installer is a person who has licensed training and a working knowledge of the applicable codes regulation, tools, equipment, and methods necessary for safe installation of an electric resistance water heater. If questions regarding installation arise, check your local plumbing and electrical inspectors for proper procedures and codes. If you cannot obtain the required information, contact the company.

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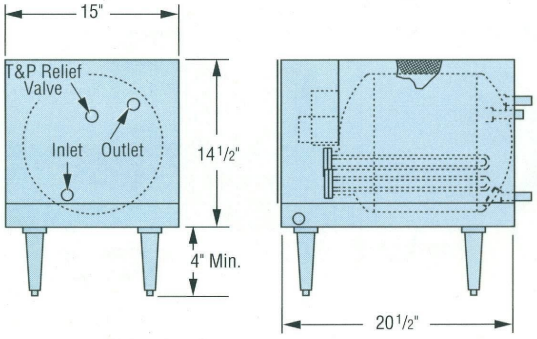
MODEL A - GENERAL SPECIFICATIONS

A6 Model

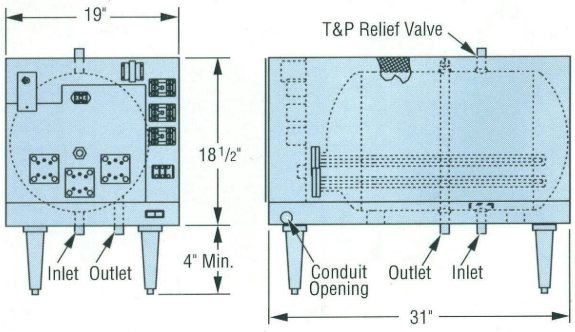


Rear View Side View

Storage Capacity: 6 gallons
KW Range: 4 thru 18 KW
Shipping Weight: 70 lbs.

Base Model Number	KW Rating	Recovery Rate in GPH For °F Temperature Rise Listed Below						
		20°	40°	60°	70°	80°	100°	140°
A64	4	82	41	27	23	21	16	7
A65	5	103	51	34	29	26	21	8
A66	6	123	62	41	35	31	25	10
A67	7	144	72	48	41	36	29	11
A68	8	164	82	55	47	41	33	13
A69	9	185	92	62	53	46	37	15
A610	10	205	103	68	59	51	41	16
A612	12	246	123	82	70	62	49	20
A613	13	267	133	89	76	67	53	21
A615	15	308	154	103	88	77	62	25
A618	18	369	185	123	105	92	74	30

A15 Model



Front View Side View

Storage Capacity: 15 gallons
KW Range: 12 thru 58 KW
Shipping Weight: 135 lbs.

Base Model Number	KW Rating	Recovery Rate in GPH For °F Temperature Rise Listed Below						
		20°	40°	60°	70°	80°	100°	140°
A1512	12	246	123	82	70	62	49	20
A1515	15	308	154	103	88	77	62	25
A1520	20	410	205	137	117	103	82	33
A1524	24	492	246	164	141	123	98	39
A1530	30	615	308	205	176	154	123	49
A1535	35	718	359	239	205	179	144	57
A1540	40	820	410	273	234	205	164	66
A1545	45	923	461	308	264	231	185	74
A1554	54	1107	554	369	316	277	221	89
A1558	58	1189	595	396	340	297	238	95

SECTION I - GENERAL DESCRIPTION AND CONSTRUCTION

GENERAL DESCRIPTION

This book describes a packaged electric booster heater that is typically used to provide 180°F sanitizing rinse water. The complete assembly consists of the storage tank, immersion electric heating element(s), thermostat, safety relief valve, safety high temperature cut out, magnetic contactor(s), and any other required electrical operating control. Optional equipment may be supplied with your unit. Please consult the product drawing for details specific to your assembly. The unit is factory assembled, insulated, jacketed, wired, tested, and ready for electrical and plumbing service connections.

CONSTRUCTION

TANK

The storage tank is constructed of type 316L stainless steel for maximum tank longevity. The tank is formed by all welded construction and is designed for a maximum allowable working pressure of 150 psi (300 psi TP).

TANK CONNECTIONS

The heater is supplied with separate connections for the cold/warm inlet and the hot water outlet. Water entering the cold water inlet is deflected by means of a baffle within the tank. A ¾-inch FNPT connection is provided for mounting a combination safety temperature and pressure relief valve. An overflow line should be utilized from the relief valve outlet to a floor drain. See drawing for locations and sizes.

HEATING ELEMENT

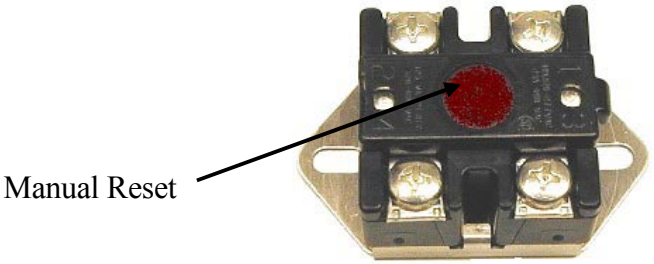
The water heater is supplied with an electric immersion heating element assembly(s), composed of incoloy or copper sheathed elements that are brazed into a brass flange. Each assembly is fastened to a corresponding tank flange using a gasket and four (4) 3/8-16 x 1-inch long hex head steel bolts and nuts. See drawing for voltage and power ratings.

CONTROL THERMOSTAT

The water heater is supplied with an immersion thermostatic switch that is installed and wired at the factory. The thermostat can be adjusted through a range of 100° - 195° F and is adjustable with a flat tip screwdriver.

TEMPERATURE HIGH LIMIT SWITCH

A surface mounted high temperature cut-off switch with manual reset, factory set at 205° F is provided. In the event of an over-temperature condition, the thermostat will disengage the operating coils in the magnetic contactor(s). The high limit must be manually reset thereafter to restart the heater.



MAGNETIC CONTACTOR

The magnetic contactor(s) is a heavy-duty resistive load type rated for 100,000 cycles. The contactor supplies power to the heating element(s) based on the resistive load (non-inductive) of the heater only when the thermostatic switch is engaged, thereby pulling in the contacts until the desired temperature is reached. At this point, the contacts will drop out, which in turn disconnects power from the elements.

OUTER SHELL, INSULATION, AND SUPPORTS

The tank is encapsulated in 2-inches of high-density fiberglass insulation. The protective shell is constructed of galvaneel and is coated with a durable silver hammertone finish. NSF approved adjustable plastic legs are provided for support.

FUSED LOW VOLTAGE TRANSFORMER

A fused low voltage transformer is supplied with all models rated for 480-volts. This component is used to step down the 480-volt power supply to 240-volts for safety when working with control circuits.

ON/OFF SWITCH

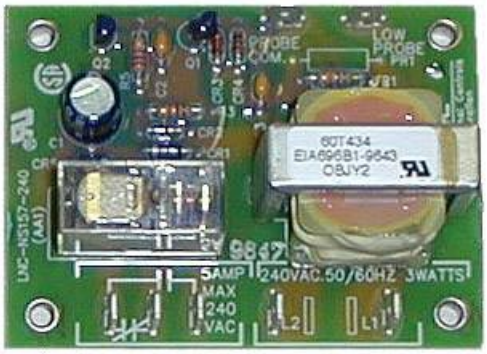
An illuminated on/off switch is provided for positive verification heater status.

OPTIONS

The following optional features may be included in your water heater. Reference included drawing specific to your heater for further details.

Low Water Cut-Off

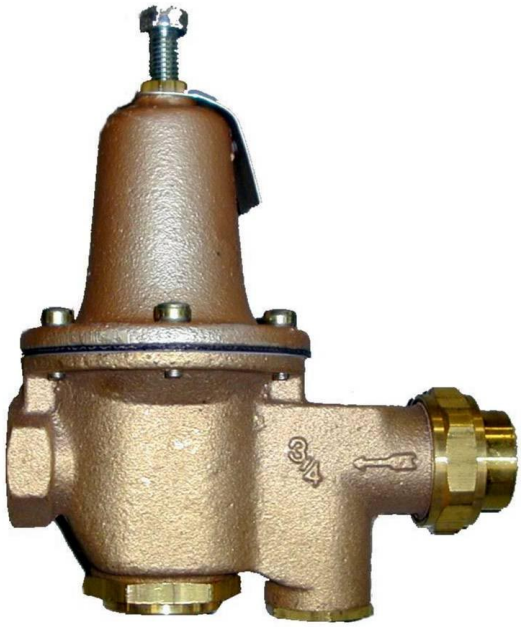
Used as a safety device, the electronic low water cut-off is used to detect a low water situation and disengage the operating coils in the magnetic contactor(s). Once the condition is remedied, the low water cut-off switch is automatically reset.



Dial Temperature and Pressure Gauge

A combination temperature (70° - 250° F) and pressure (0 – 200 psi) gauge with 2½-inch dial may be supplied for in-line installation (shipped loose).

Pressure Reducing Valve
An optional pressure reducing valve with built-in bypass may be supplied. This valve is shipped separately for in-line installation.



Stainless Steel Outer Jacket
An optional stainless steel outer jacket may replace the standard galvaneel jacket.

Stainless Steel Legs
As an option, 6-inch adjustable stainless steel legs may be supplied.

SECTION II – INSTALLATION

WARNING / CAUTION

DO NOT TURN ON THE ELECTRIC POWER SUPPLY to this equipment until heater is completely filled with water and all air has been released. *If the heater is NOT filled with water when the power is turned on, the heating elements will burn out.*

For protection against excessive pressures and temperatures, local codes require the installation of a temperature-and-pressure (T&P) relief valve certified by a nationally recognized laboratory that maintains periodic inspection of production of listed equipment of materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff for Hot Water Supply Systems. ANSI Z21.22-1971. THE CUSTOMER IS RESPONSIBLE TO PROTECT PROPERTY AND PERSONNEL FROM HARM WHEN THE VALVE FUNCTIONS.

All water heaters have a risk of leakage at some unpredictable time. IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE A CATCH PAN OR OTHER ADEQUATE MEANS, SO THAT THE RESULTANT FLOW OF WATER WILL NOT DAMAGE FURNISHINGS OR PROPERTY.

WATER HEATER PLACEMENT

1. Place the heater on a solid foundation in a clean, dry location as near as possible to the dish washing machine.

2. The water heater should be protected from freezing and waterlines insulated to reduce energy and water waste.

3. Leave a minimum of 18” clearance for element withdrawal, if necessary.

4. Do not install in an area where flammable liquids or combustible vapors are present.

PIPING INSTALLATION

NOTE: The most effective means for preventing deterioration from accelerated corrosion due to galvanic and stray current is the installation of dielectric fittings/unions. The installation of these fittings is the responsibility of the installing contractor.

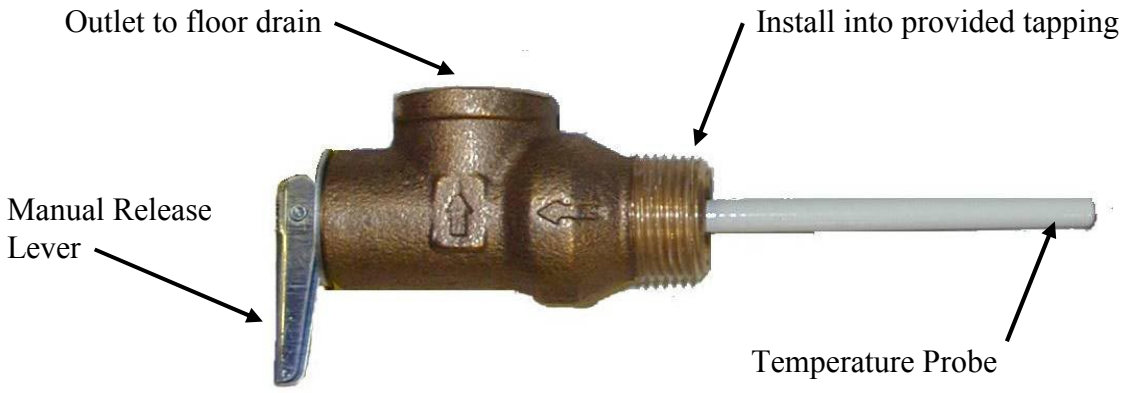
1. Connect the cold water inlet and hot water outlet to the appropriate connections as shown; refer to the drawing for location and sizes.

2. Install water pressure regulator, if supplied, and adjust to the pressure recommended by the dishwasher manufacturer. WHEN A STANDARD PRESSURE REGULATOR IS USED, (other than that purchased with the booster), it acts as a check valve and it is possible that thermal expansion will cause the relief valve to drip or occasionally blow off a small amount

of water. To over come this condition, it is recommended that a 3/8" by-pass arrangement with a horizontal check valve be installed around the pressure regulator. This will prevent annoyance caused by the relief valve dripping or blowing off.

3. Install in-line pressure and temperature gauge, if supplied.

4. Install the combination temperature and pressure safety relief valve in the tapping provided. Note that this is required by law for safety considerations.



Temperature and Pressure Relief Valve

5. Install a relief valve overflow pipe to a nearby floor drain. CAUTION: No valve of any type should be installed between the relief valve and tank or in the drain line.

FILLING THE HEATER

1. Open the pressure relief valve test lever to allow air to escape.

2. Open the valve to the cold water inlet and allow the heater and piping system to completely fill, as indicated by a steady flow of water from the relief valve.

ELECTRICAL INSTALLATION

1. Enter electric enclosure with properly sized feeder leads. Single-phase installations require two (2) leads; three phase installations require three (3) leads.

2. Install these power leads into the box lugs on the terminal block or magnetic contactor. See wiring diagrams below.

3. Torque screws per torque chart included in Section VI.

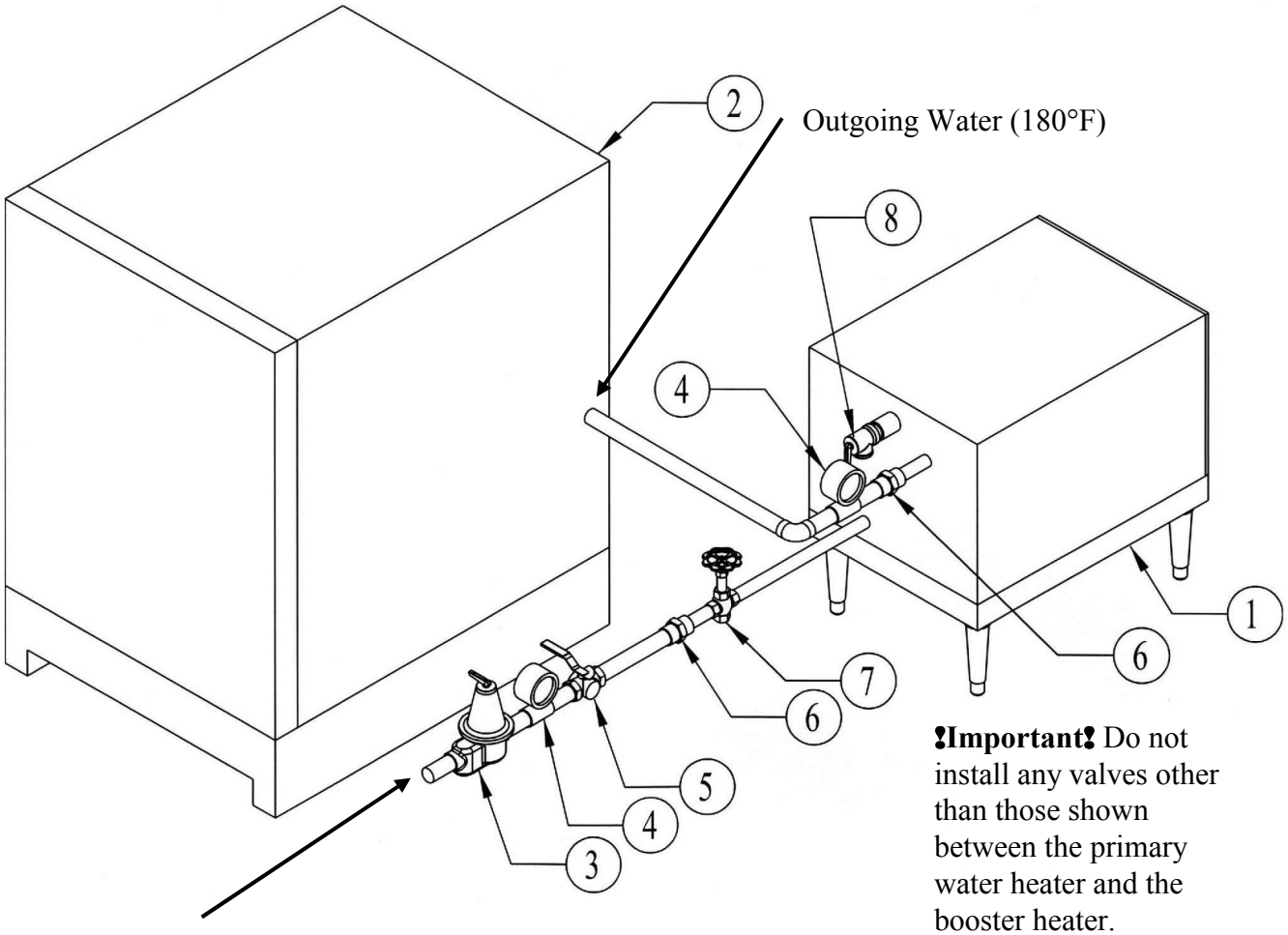
4. All other electrical connections are made at the factory; therefore, no other electrical connections are necessary.

FINAL CHECKS

1. Check all connections for tightness.

2. Ensure that all the above steps are completed

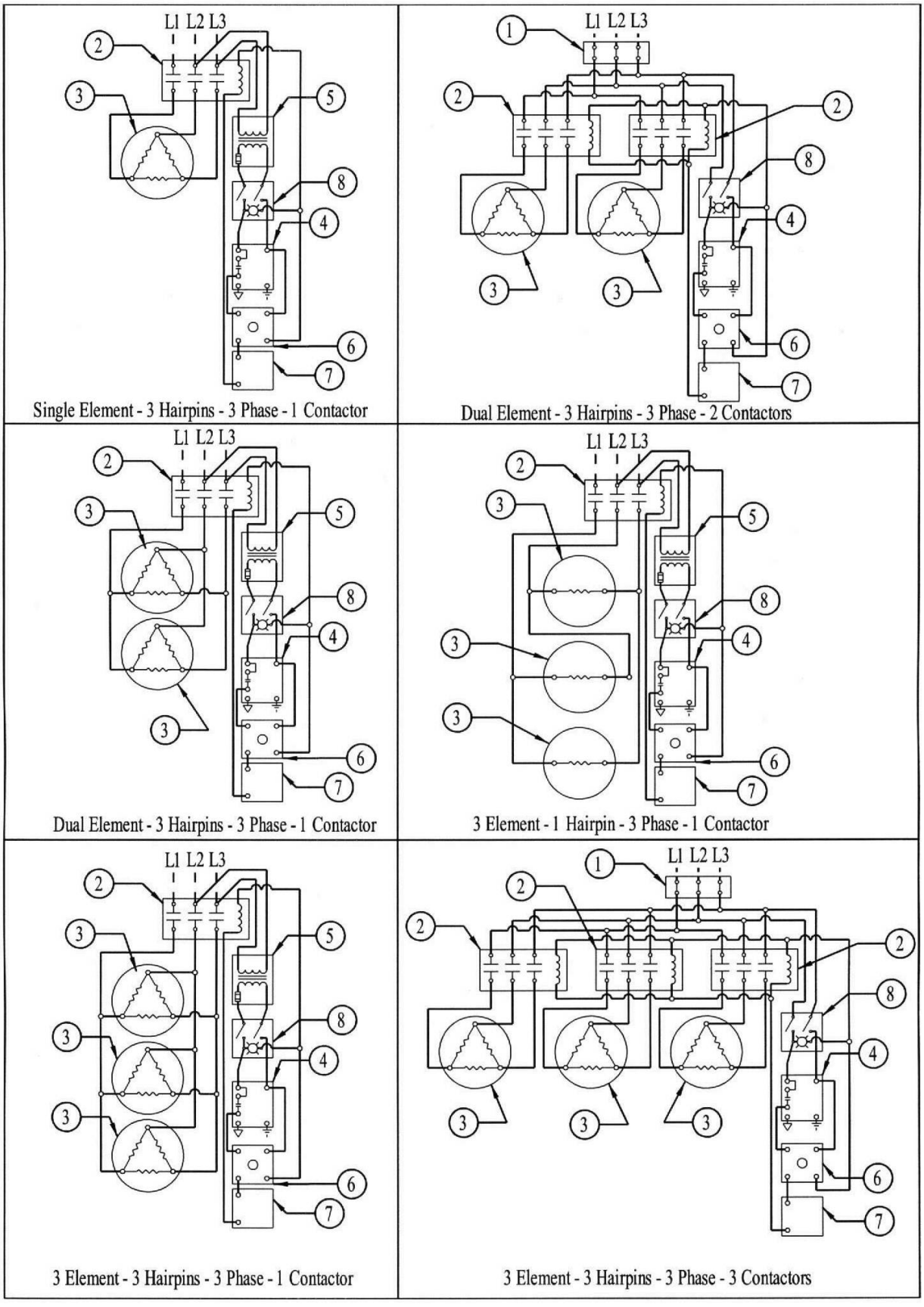
3. After the water is heated for the first time, monitor the water temperature as described in Section III, Quarterly Inspection.

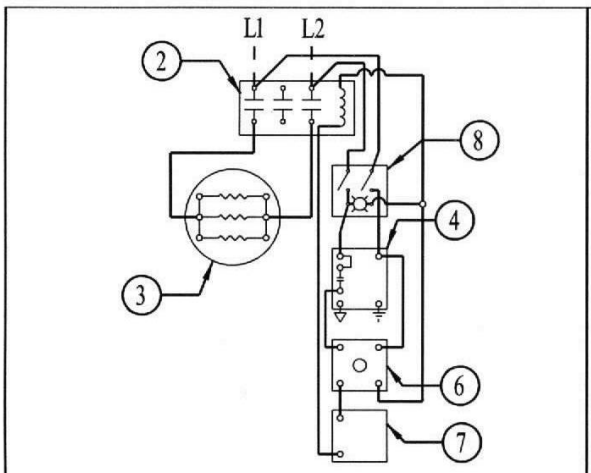


!Important! Do not install any valves other than those shown between the primary water heater and the booster heater.

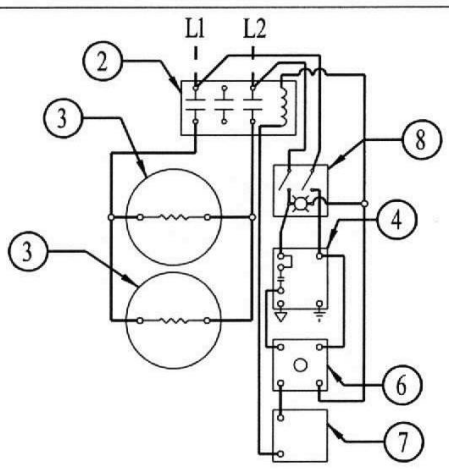
Incoming Water (140°F)

1 – A Model Booster
2 – Dishwasher
3 – Pressure Regulator w/ built-in by-pass
4 – Pressure/Temperature Gauge
5 – Shut-Off Valve
6 – Union
7 – Drain Valve
8 – Pressure and Temperature Relief Valve (pipe overflow to floor drain or sink)

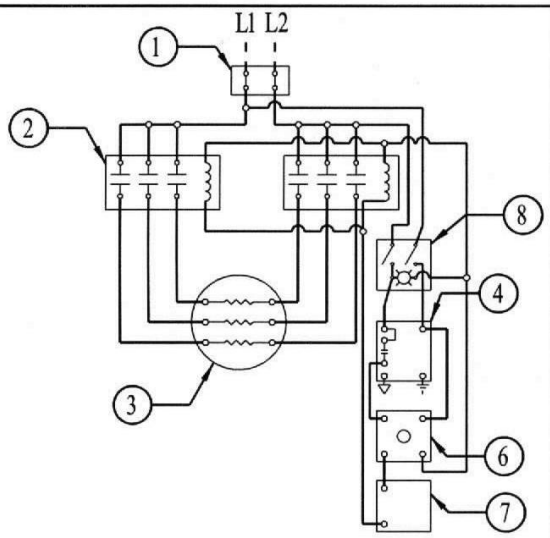

L1 L2 L3
Single Element - 3 Hairpins - 3 Phase - 1 Contactor
L1 L2 L3
Dual Element - 3 Hairpins - 3 Phase - 2 Contactors
L1 L2 L3
Dual Element - 3 Hairpins - 3 Phase - 1 Contactor
L1 L2 L3
3 Element - 1 Hairpin - 3 Phase - 1 Contactor
L1 L2 L3
3 Element - 3 Hairpins - 3 Phase - 1 Contactor
L1 L2 L3
3 Element - 3 Hairpins - 3 Phase - 3 Contactors



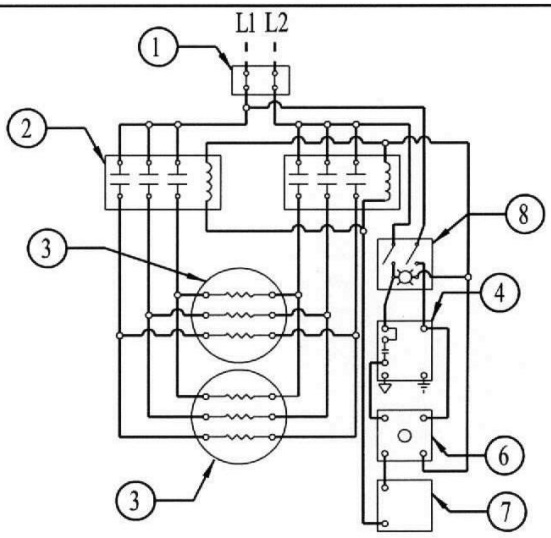
Single Element - 1 or 3 Hairpins - Single Phase - 1 Contactor



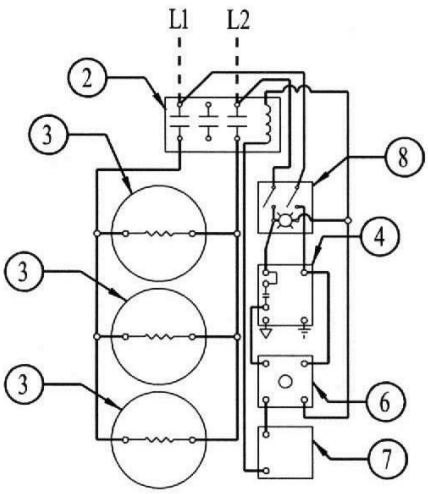
Dual Element - 1 Hairpin - Single Phase - 1 Contactor



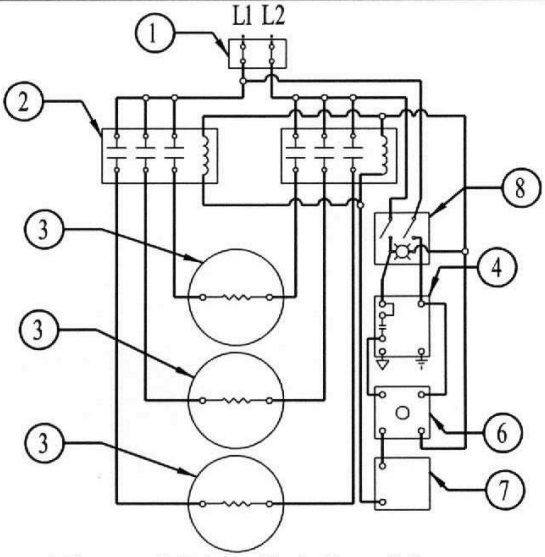
Single Element - 3 Hairpins - Single Phase - 2 Contactors



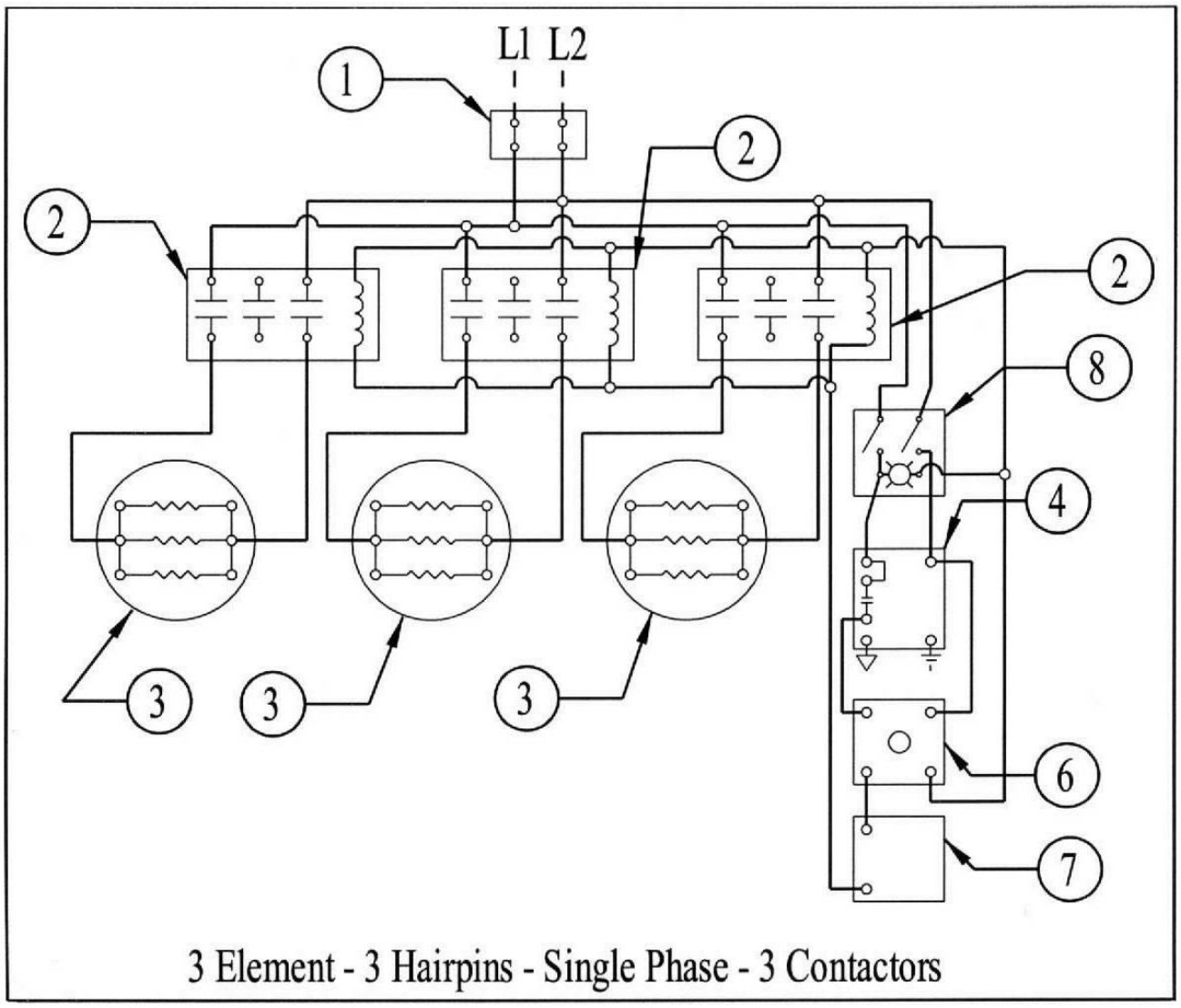
Dual Element - 3 Hairpins - Single Phase - 2 Contactors



3 Element - 1 Hairpin - Single Phase - 1 Contactor



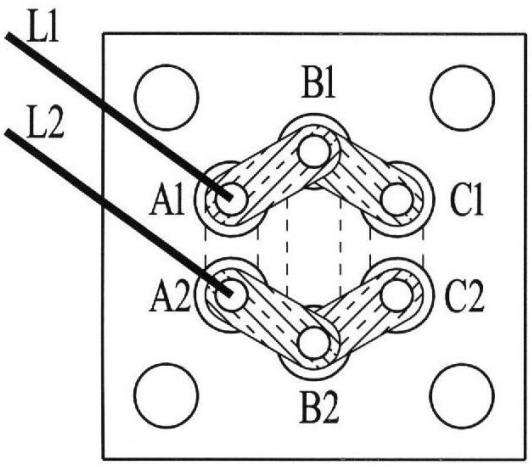
3 Elements - 1 Hairpin - Single Phase - 2 Contactors



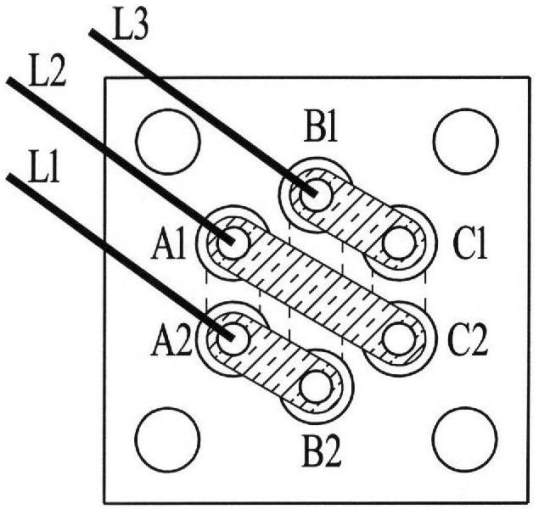
3 Element - 3 Hairpins - Single Phase - 3 Contactors

1 – Terminal Block
2 – Magnetic Contactor
3 – Heating Element
4 – Low Water Cut-Off, if supplied
5 – Transformer, 480-Volt/240-Volt, installed on 480-Volt models only.
6 – High-Temperature Limit Switch
7 – Control Thermostat
8 – Illuminated On/Off Switch

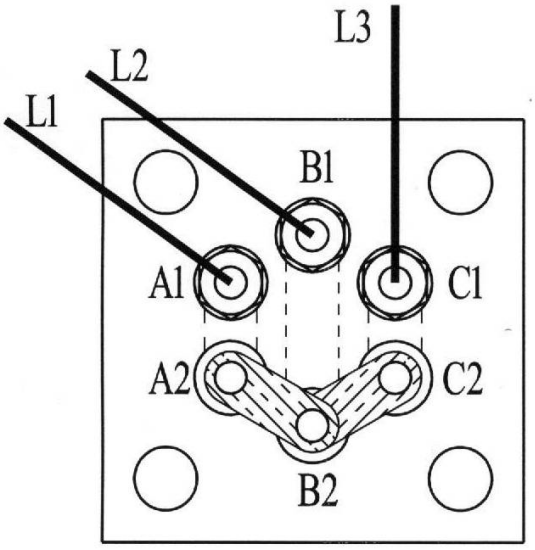
JUMPER CONFIGURATION



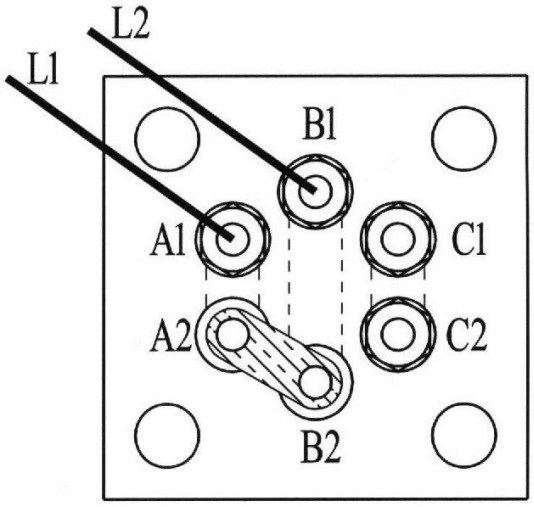
1 PHASE
208 OR 240 VOLT



3 PHASE DELTA
208 OR 240 VOLT



3 PHASE WYE
380 TO 575 VOLT



1 PHASE
480 VOLT

SECTION III - SCHEDULED MAINTENANCE AND OPERATION

WARNING / CAUTION

Before performing any maintenance procedure, make certain power supply is OFF and cannot accidentally be turned on.

MAINTENANCE AND OPERATION

The water heater is automatic in its operation. It will maintain a full tank of water at the temperature setting of the thermostat. The water heater should not be turned on without first making sure that the tank is full of water and that all air has been released.

FREEZING

The tank should be fully drained in the event the electricity has been turned off and if there is danger of freezing.

QUARTERLY INSPECTION

1. Monitor thermostat

    a. Let water heater completely heat to a designated thermostat setting.
    b. After thermostat satisfies (that is, when the thermostat actually clicks off), draw water from heater.
    c. Compare water temperature of drawn water to the temperature setting of the thermostat when it satisfies. Normal variation between the two points is approximately $\pm$ 5°F.
    d. If these two readings do not coincide within acceptable tolerances and verification has been made of the accuracy of the temperature-reading gauge, replace the thermostat.

2. Lift test lever on relief valve and let water run through valve for a period of approximately 10 seconds. This will help flush away any sediment that might build up in water passageways.

3. Inspect element flange for leakage as follows:

    a. Shut off Power Supply.
    b. Remove element housing cover.
    c. Visually inspect heating element gasket for evidence of leaks.
    d. Rub finger around gasket that is between the heating element and tank flange for any evidence of moisture. If moisture is present or a water drip is observed, follow procedure outlined in Section V.

4. Check for loose electrical connections. Tighten as necessary.

ANNUAL INSPECTION

1. Flush tank as follows

    a. Shut off power supply.
    b. Close valve on hot water outlet piping.
    c. Open valve on drain piping.
    d. Cold water inlet line pressure will be strong enough to flush sediment from the bottom of the tank out through the drain. Let water run for 3-4 minutes.
    e. Close drain valve.
    f. Open hot water valve.
    g. Turn power supply ON.

SECTION IV – TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action / Remedy
No hot water	Circuit breaker tripped at source.	Reset circuit breaker.
	On/Off switch in 'OFF' position	Turn switch to 'ON' position
	Blown fuse in transformer, if installed.	Replace fuse.
	High limit switch tripped.	Reset high limit switch.
	Loose wires.	Tighten wires. Torque screws per torque chart included in Section VI.
	Heating element inoperable.	Check heating element operation by clamping an Amprobe around each wire to the element. The ampere reading should agree with the nameplate 'AMP' figure.
	Low line voltage.	Have source electrical system checked by an electrician.
	Faulty thermostat.	Move thermostat dial through full range. A definite 'click' should be heard. If not, replace thermostat.
	Faulty low water cut-off, if installed.	Check to see if tank is full of water. If not, fill tank. If problem continues and tank is full, check for continuity between the common and normally open contact of the relay board. If continuity is not observed, replace low water cut-off.
	Magnetic contactor does not energize.	Replace complete magnetic contactor. Because of the design of this particular contactor, it is more desirable to replace complete control rather than rebuilding coil, contacts and springs, etc.

Water temperature below settings at all times	Faulty thermostat.	Check thermostat adjustment. Monitor thermostat as described in Section III, Quarterly Inspection. Replace if necessary.
	Heating element not working on all phases	Check to see that heating element is working on all phases, by checking the resistance (ohms) value for each element and comparing with the chart included in Section VI.
	Heater improperly sized	Verify heater is properly sized for the flow rate and temperature rise of your system. See formulas included in Section VI. Replace elements with proper size as necessary.
Relief valve discharges continuously	Excessive temperature or pressure in tank	Temperature and pressure relief valves are made to operate if the water temperature exceeds 210°F or water pressure exceeds the pressure rating of the safety relief valve. If trouble is excessive temperature, then thermostat is not shutting off at the right setting and thermostat must be replaced.

SECTION V - SERVICING & REPLACEMENT OF PARTS

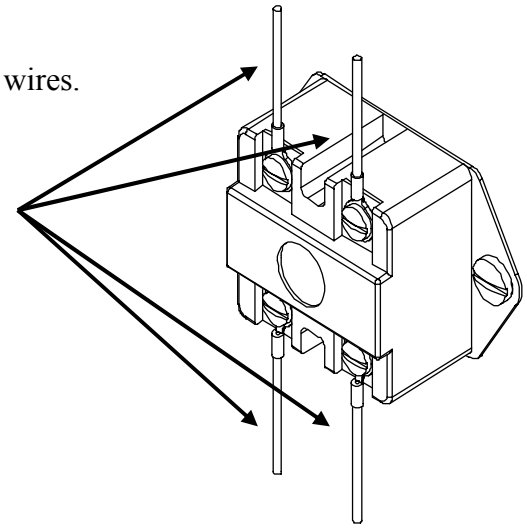
WARNING / CAUTION

Before servicing or replacing any part make sure to turn the power supply switch to the OFF position.

SURFACE TEMPERATURE HIGH LIMIT CUT-OFF

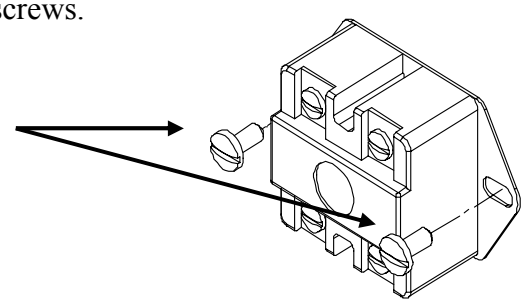
1. Disconnect power from unit.
2. Remove access cover.
3. Disconnect the four (4) 14 gauge wires.

Control Wires



4. Remove the two (2) mounting screws.

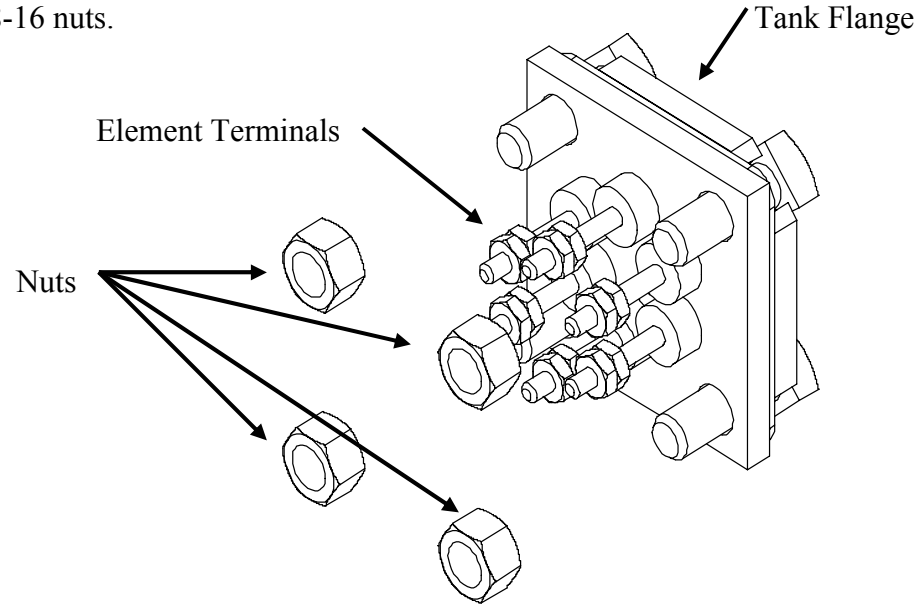
Mounting Screws



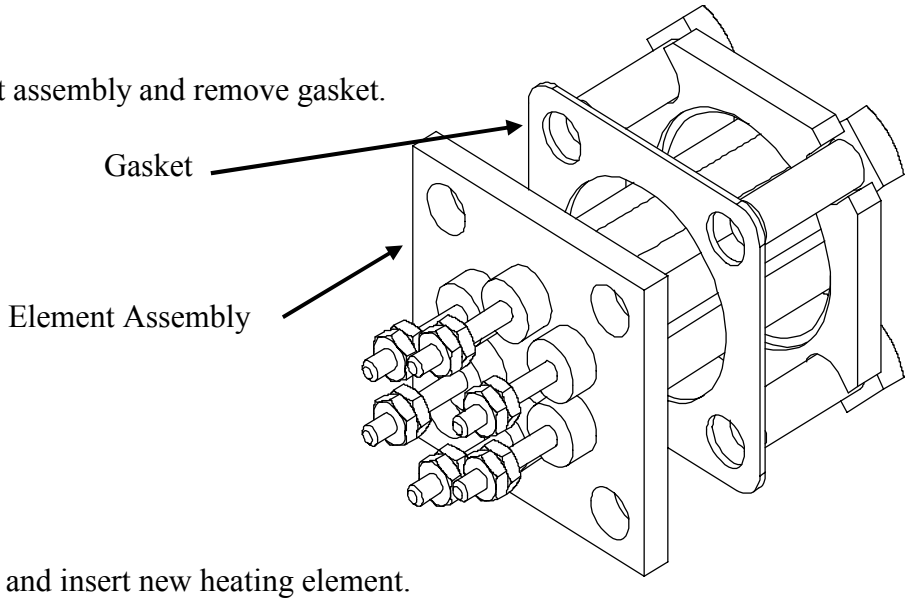
5. Replace control and install new high limit switch by performing above steps in reverse order. See wiring diagram included with drawing for assistance.

HEATING ELEMENT

1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Lift manual release lever on relief valve to let air into system or break union on outgoing water line.
5. Drain water from tank.
6. Disconnect the wires from the heating element terminals. Note that picture shown is a three-phase heating element; a single-phase element has only two terminals.
7. Remove the 3/8-16 nuts.



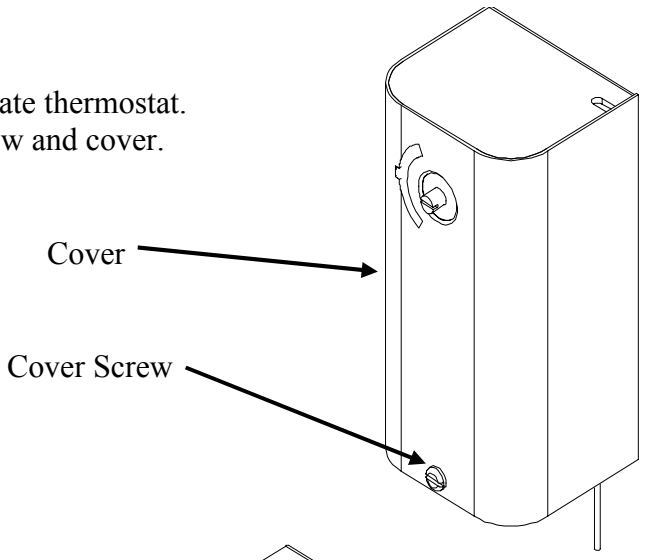
8. Withdraw element assembly and remove gasket.



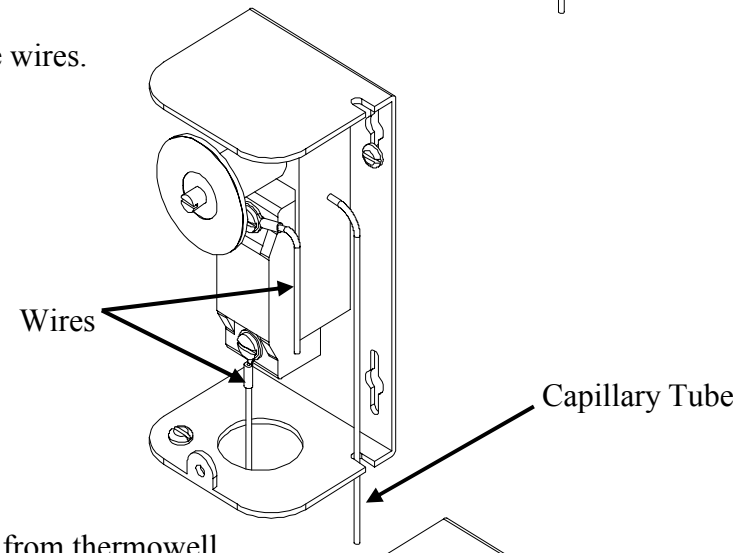
9. Install new gasket and insert new heating element.
10. Rewire element according to the installation instructions as shown in the Section II.
11. Fill tank and check around gasket for any leaks.

IMMERSION THERMOSTAT

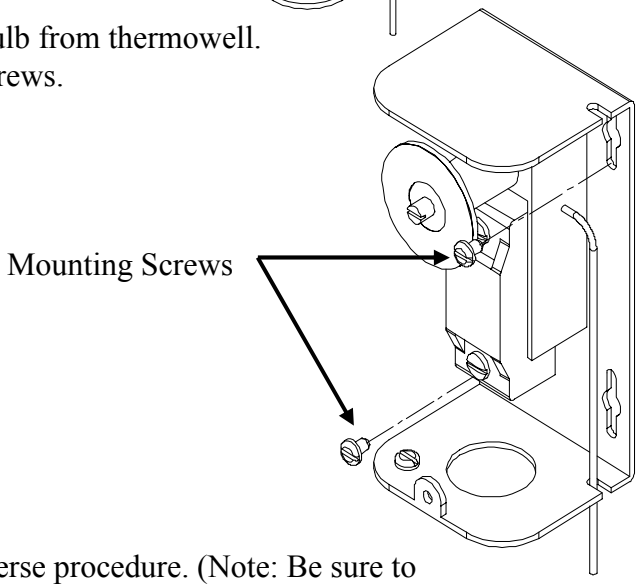
1. Disconnect power from unit.
2. Remove access cover and locate thermostat.
3. Remove high limit cover screw and cover.



4. Disconnect the two (2) 14 gauge wires.



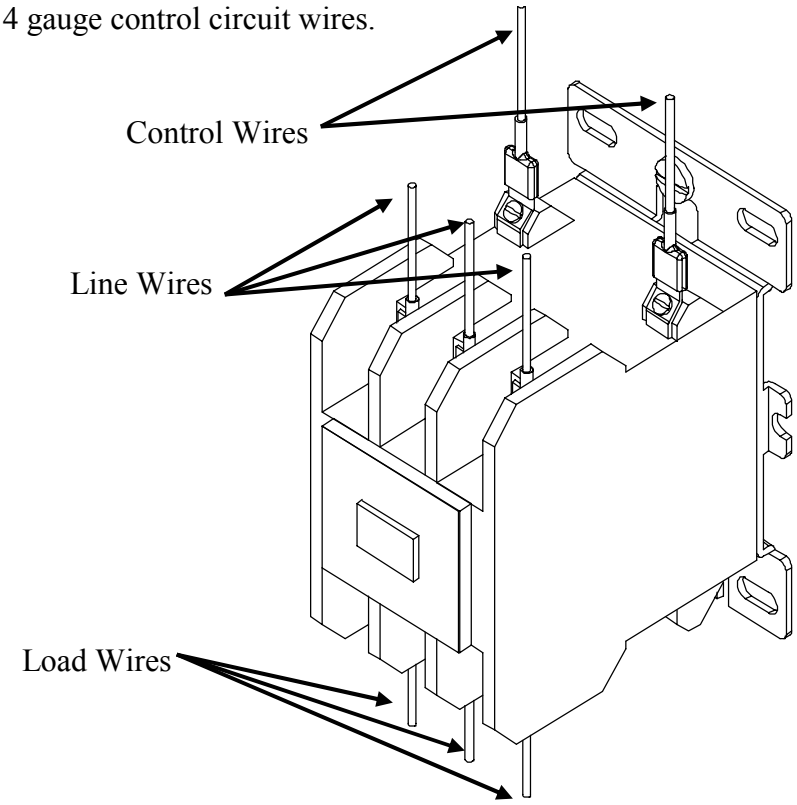
5. Remove capillary tube and bulb from thermowell.
6. Remove two (2) mounting screws.



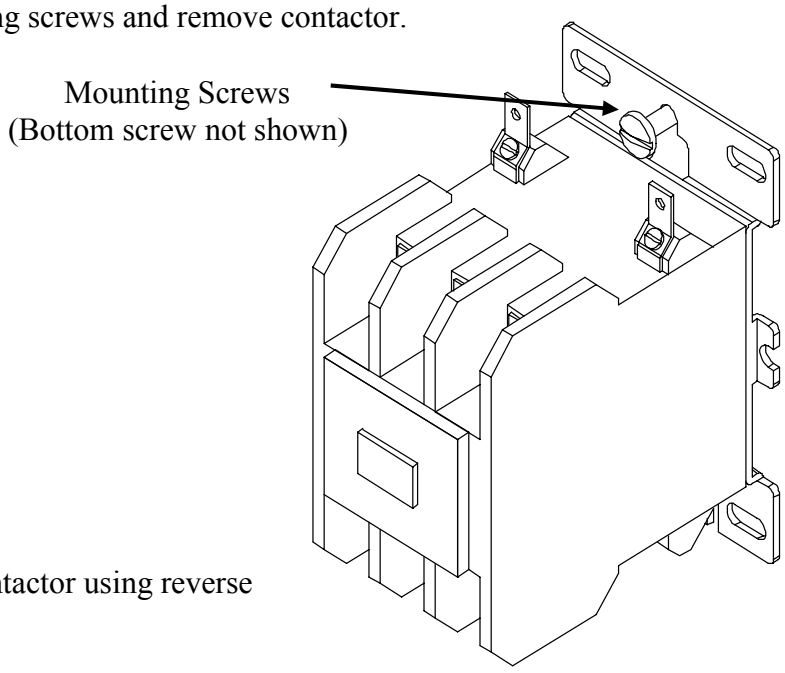
7. Replace thermostat using reverse procedure. (Note: Be sure to place capillary tube into slot in base prior to installing cover.)

MAGNETIC CONTACTOR

1. Disconnect power from unit.
2. Disconnect line and load wires to contactor.
3. Disconnect two (2) 14 gauge control circuit wires.



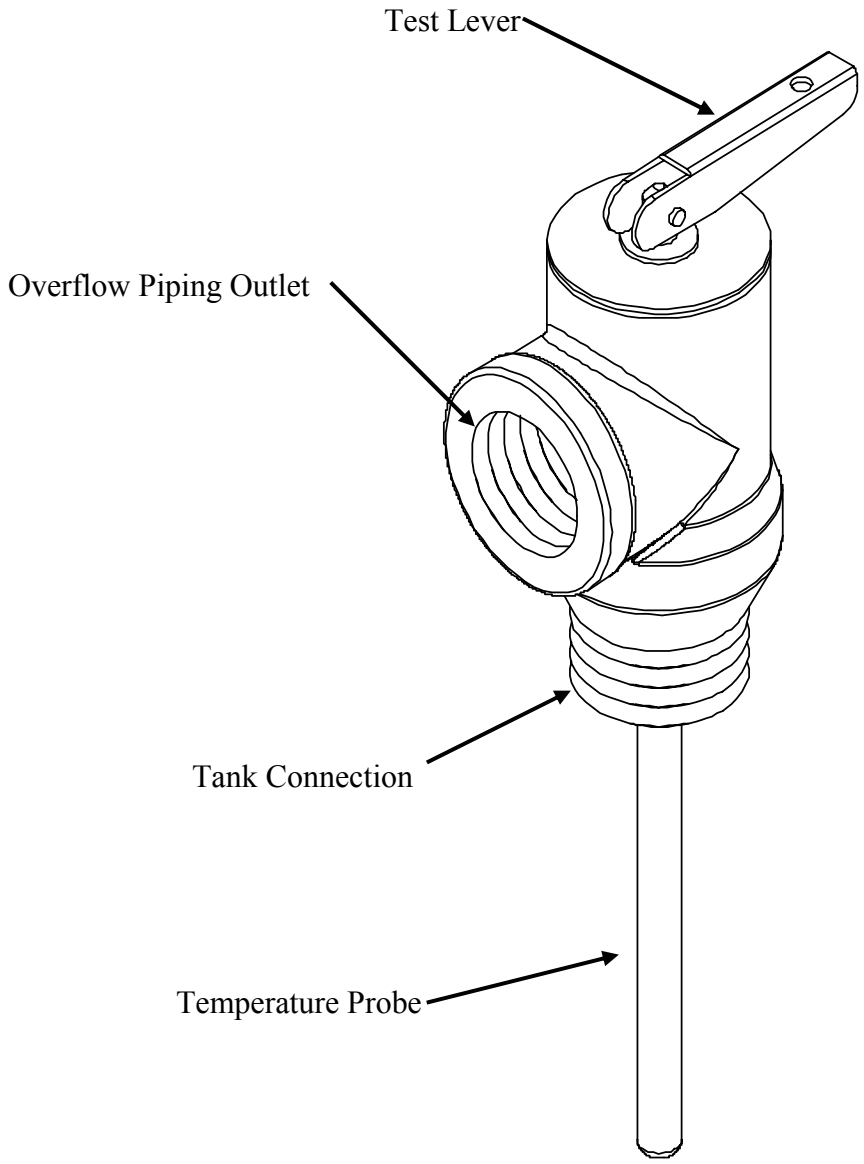
4. Loosen two (2) holding screws and remove contactor.



5. Replace with new contactor using reverse procedure.

RELIEF VALVE

1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Lift test lever on relief valve to relieve pressure in tank.
4. Disconnect overflow piping.
5. Unscrew relief valve, remove assembly and replace with new one.
6. Connect overflow piping.
7. Turn on incoming water supply and check for leaks.
8. Turn safety switch to ON position.



SECTION VI – MISCELLANEOUS CHARTS AND FORMULAS

ELEMENT CHART

Element Part #	Power (Watts)				Immersion Length	Element Resistance (Ohms)
	120V	208V	240V	480V		
CH-FO-358	----	3500	----	----	11 3/8"	12.36
CH-FO-408	----	4000	----	----	11 3/8"	10.82
CH-FO-508	----	5000	----	----	13 1/4"	8.65
CH-FO-608	2000	6000	----	----	13 3/8"	7.21
CH-FO-304	----	----	3000	----	9 3/4"	19.20
CH-FO-354	----	2500	3500	----	9 3/4"	16.46
CH-FO-404	----	3000	4000	----	11 1/2"	14.40
CH-FO-454	----	----	4500	----	11 1/2"	12.80
CH-FO-504	----	----	5000	----	11 1/2"	11.52
CH-FO-604	1500	4500	6000	----	13 1/2"	9.60
TGB-1403-480	----	----	1000	4000	13 5/8"	41.62
TGB-2457-480	----	----	----	4500	13 1/4"	36.99
TGB-2503-480	----	1000	----	5000	9 3/4"	33.29
TGB-2603-480	----	----	1500	6000	15 1/2"	27.74

*Red wattage indicates the stamped element rating

Element Part #	Power (kW)			Immersion Length	Resistance (Ohms)			
	208V	240V	480V		Hairpin	1 Φ	3 Φ DELTA	3 Φ WYE
2-38683N	2.5	3	4	13"	57.6	19.2	57.6	38.6
3-38683N	3	4	5	13"	43.2	14.4	43.2	28.9
4-38683N	4	5	6	13"	34.4	11.5	34.4	23.0
5-38683N	5	6	8	13"	27.9	9.3	27.9	18.7
6-38683N	6	8	10	13"	21.6	7.2	21.6	14.5
7-38683N	8	10	12	13"	17.1	5.7	17.1	11.5
8-38683N	10	12	15	13"	14.4	4.8	14.4	9.6
9-38683N	12	15	20	15"	12.1	4.0	12.1	8.1
10-38683N	15	20	----	15"	9.1	3.0	9.1	6.1
11-38683N	17.3	----	----	15"	7.5	2.5	7.5	5.0

FORMULAS

RECOVERY

$$GPH \times \frac{}{} \ ^{\circ}F\ \Delta T \times 0.00244 = KW$$

$$KW \times 410 \div GPH = \frac{}{} \ ^{\circ}F\ \Delta T$$

$$KW \times 410 \div \frac{}{} \ ^{\circ}F\ \Delta T = GPH$$

Note: *1 KW will heat 4.1 GPH at a 100°F ΔT*

ELECTRICAL

$$\frac{KW \times 1000}{Volts} \div 1.73 = Amps\ 3\ \Phi$$

$$\frac{KW \times 1000}{Volts} = Amps\ 1\ \Phi$$

METRIC CONVERSION

Liters x 0.2641 = Gallons

Gallons x 3.79 = Liters

Gallons x 0.003785 = m^3

m^3 x 264.2 = Gallons

$1^{\circ}C\ \Delta T = 1.8^{\circ}F\ \Delta T$

$^{\circ}F = (^{\circ}C \times 1.8) + 32$

$^{\circ}C = (^{\circ}F - 32) \times 0.556$

psi x 0.06896 = Bar

Bar x 14.5 = psi

psi x 6.86 = kPa

kPa x 0.1456 = psi

Lbs x 0.4536 = Kg

Kg x 2.2 = Lbs

Watts/Sq.Cm. x 6.4 = Watts/Sq.In.

Watts/Sq.In. x 0.155 = Watts/Sq.Cm.

TORQUE VALUES

BOLT SIZE	18-8 S/S IN.-LBS.	BRASS IN.-LBS.	SILICON BRONZE IN.-LBS.	ALUMINUM 2024-T4 IN.-LBS.	316 S/S IN.-LBS.	MONEL IN.-LBS.
4-40	5.2	4.3	4.8	2.9	5.5	5.3
4-48	6.6	5.4	6.1	3.6	6.9	6.7
5-40	7.7	6.3	7.1	4.2	8.1	7.8
5-44	9.4	7.7	8.7	5.1	9.8	9.6
6-32	9.6	7.9	8.9	5.3	10.1	9.8
6-40	12.1	9.9	11.2	6.6	12.7	12.3
8-32	19.8	16.2	18.4	10.8	20.7	20.2
8-36	22.0	18.0	20.4	12.0	23.0	22.4
10-24	22.8	18.6	21.2	13.8	23.8	25.9
10-32	31.7	25.9	29.3	19.2	33.1	34.9
1/4-20	75.2	61.5	68.8	45.6	78.8	85.3
1/4-28	94.0	77.0	87.0	57.0	99.0	106.0
5/16-18	132	107	123	80	138	149
5/16-24	142	116	131	86	147	160
3/8-16	236	192	219	143	247	266
3/8-24	259	212	240	157	271	294
7/16-14	376	317	349	228	393	427
7/16-20	400	327	371	242	418	451
1/2-13	517	422	480	313	542	584
1/2-20	541	443	502	328	565	613
9/16-12	682	558	632	413	713	774
9/16-18	752	615	697	456	787	855
5/8-11	1110	907	1030	715	1160	1330
5/8-18	1244	1016	1154	798	1301	1482
3/4-10	1530	1249	1416	980	1582	1832
3/4-16	1490	1220	1382	958	1558	1790
7/8-9	2328	1905	2140	1495	2430	2775
7/8-14	2318	1895	2130	1490	2420	2755
1-8	3440	2815	3185	2205	3595	4130
1-14	3110	2545	2885	1995	3250	3730